CLAIMS

1. A semiconductor laser device having a waveguide constructed in a stack of layers (102-111) including, on a substrate (101) transparent and having a refractive index n_s for laser light, a first clad layer (103) of a refractive index n_{c1}, a second clad layer (104) of a refractive index n_{c2}, a third clad layer (105) of a refractive index n_{c3}, a first conductivity type guide layer (106) of a refractive index n_g, an active quantum well layer (107), a second conductivity type guide layer (109), a second conductivity type clad layer (110), and a second conductivity type contact layer (111) deposited in this order, wherein said waveguide has an effective refractive index n_e, and a relationship of $n_{c2} < (n_{c1}, n_{c3}) < n_e < (n_s, n_g)$ is satisfied.

2. The semiconductor laser device of claim 1, wherein said first clad layer (103) has a thickness of d_{c1}, said second clad layer (104) has a thickness of d_{c2} and said third clad layer (105) has a thickness of d_{c3}, and then $d_{c2}, d_{c3} < d_{c1}$ and $1.4\ \mu m \leq d_{c1} + d_{c2} + d_{c3}$ are satisfied.

3. The semiconductor laser device of claim 1, wherein said second clad layer (104) is made of a group III-V semiconductor containing Al and said active quantum well layer (107) is made of a group III-V semiconductor containing In.

4. The semiconductor laser device of claim 1, wherein said substrate (101) and said stack of layers (102-111) are made of nitride semiconductors, and then said first, second and third clad layers (103, 104, 105) all contain Al.

5. The semiconductor laser device of claim 4, wherein said first clad layer (103) has a thickness of d_{c1}, said second clad layer (104) has a thickness of d_{c2} and said third clad layer (105) has a thickness of d_{c3}, and then $d_{c2}, d_{c3} < d_{c1}$ and $1.4\ \mu m \leq d_{c1} + d_{c2}$

+ $d_{c3} \leq 4.5$ μm are satisfied.

6. The semiconductor laser device of claim 5, wherein said second clad layer (104) is made of a nitride semiconductor having an Al composition ratio x_{c2} of $0.06 \leq x_{c2} \leq 0.3$ in the group III elements, and has a thickness d_{c2} of $0.05\ \mu m \leq d_{c2} \leq 0.35\ \mu m$.

7. The semiconductor laser device of claim 6, wherein said first clad layer (103) has an Al composition ratio $x_{c1} \leq 0.07$ in the group III elements and said third clad layer (105) has an Al composition ratio $x_{c3} \leq 0.07$ in the group III elements.

8. The semiconductor laser device of claim 1, wherein on a laser beam emitting end surface, one of an optical absorber and an optical reflective film (800) is formed in an optical radiation region (810; 820) below said first clad layer (103).

9. The semiconductor laser device of claim 8, wherein said optical absorber film or said optical reflective film (800) is formed on at least 35% area of said optical radiation region (810; 820).

10. The semiconductor laser device of claim 8, wherein in said optical radiation region (810; 820), said optical absorber film or said optical reflective film (800) is formed on a portion of at least 65% of an area (820) located below said waveguide.

11. The semiconductor laser device of claim 8, wherein said optical reflective film (800) has an optical transmittance of at most 50%.

12. A nitride semiconductor laser device having a waveguide constructed in a stack of layers (702; 703; 705-711) including, on a substrate (701) transparent and having a refractive index n_s for laser light, a first conductivity type clad layer (703; 705),

10/510324

DT04 Rec'd PCT/PTO 04 OCT 2004

a first conductivity type guide layer (706) of a refractive index n_g, an active quantum well layer (707), a second conductivity type guide layer (709), a second conductivity type clad layer (710), and a second conductivity type contact layer (711) deposited in this order, wherein:

said optical waveguide has an effective refractive index $n_e < n_s, n_g$, said first conductivity type clad layer (703; 705) includes a first region, a second region, and a third region in this order in its thickness direction, said second region having an Al composition ratio larger than said first and third regions, and then said first, second and third regions all having their respective refractive indexes smaller than n_e.

13. (Amended) The nitride semiconductor laser device of claim 12, wherein a total thickness d_t including said first, second and third regions is in a range of $1.4\ \mu m \leq d_t \leq \underline{4.5}\ \mu m$.

14. The nitride semiconductor laser device of claim 13, wherein in said second region, a maximum Al composition ratio x_{max} is in a range of $0.06 \leq x_{max} \leq 0.35$.

15. The nitride semiconductor laser device of claim 13, wherein a portion having the maximum Al composition ratio x_{max} in said second region in said first conductivity type clad layer (703; 705) is located at a position farther than $2d_t/3$ in a direction from said substrate toward said active layer.

16. The semiconductor laser device of claim 12, wherein on a laser beam emitting end surface, one of an optical absorber film and an optical reflective film (800) is formed on an optical radiation region (810; 820) below said first conductivity type clad layer (703; 705).

17. The semiconductor laser device of claim 16, wherein said optical absorber

film or said optical reflective film (800) is formed on at least 35% area of said optical radiation region (810; 820).

18. The semiconductor laser device of claim 16, wherein in said optical radiation region (810; 820), said optical absorber film or said optical reflective film (800) is formed on a portion of at least 65% of an area (820) located below said waveguide.

19. The semiconductor laser device of claim 16, wherein said optical reflective film (800) has an optical transmittance of at most 50%.